

What is claimed is:

1. A liquid crystal display apparatus, comprising:

a timing controller to generate a plurality of compensated grayscale data;

a memory to store grayscale data or the compensated grayscale data;

5 a column driver to apply the compensated grayscale data to a plurality of data lines;

a gate driver to apply a gate signal to a plurality of gate lines; and

a liquid crystal panel including the gate lines, the data lines and a plurality of switching element disposed between the data lines and the gate lines.

10 2. The liquid crystal display apparatus according to claim 1, wherein the timing controller comprising:

a data compensator to generate first compensated grayscale data in response to grayscale data previously stored in the memory and grayscale data for a current frame;

15 a difference calculator to generate second compensated grayscale data in response to the grayscale data for the current frame and the first compensated grayscale data; and

a grayscale modifier to generate third compensated grayscale data in response to the first compensated grayscale data and compensated grayscale data previously stored in the memory.

3. The liquid crystal display apparatus according to claim 1, wherein the timing controller comprising:

a data compensator to generate first compensated grayscale data in response to grayscale data previously stored in the memory and grayscale data for a current frame;

a grayscale modifier to generate second compensated grayscale data in response to the first compensated grayscale data and compensated grayscale data previously stored in the memory; and

a difference calculator to generate third compensated grayscale data in response to the grayscale data for a current frame and the second compensated grayscale data.

4. The liquid crystal display apparatus according to claim 1, wherein the memory includes at least one frame memory for receiving and storing both the grayscale data and the compensated grayscale data.

5. The liquid crystal display apparatus according to claim 4, wherein the frame memory stores the compensated grayscale data having the number of bits substantially smaller than the number of bits of the grayscale data.

6. The liquid crystal display apparatus according to claim 4, wherein the at least one frame memory includes a synchronous dynamic random access memory (SDRAM) or Double Date Rate (DDR) memory.

7. The liquid crystal display apparatus according to claim 1, wherein the memory includes a first frame memory for receiving and storing the grayscale data and a second frame memory for receiving and storing the compensated grayscale data.

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8. The liquid crystal display apparatus according to claim 7, wherein the first and second frame memories each include a synchronous dynamic random access memory (SDRAM) or Double Date Rate (DDR) memory.

10 9. The liquid crystal display apparatus according to claim 2, wherein the data compensator includes a look-up table.

10. The liquid crystal display apparatus according to claim 3, wherein the data compensator includes a look-up table.

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11. The liquid crystal display apparatus according to claim 1, wherein the liquid crystal panel includes a Patterned Vertical Alignment mode liquid crystal panel.

12. The liquid crystal display apparatus according to claim 2, wherein the first compensated grayscale data includes overshoot data or undershoot data.

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13. The liquid crystal display apparatus according to claim 3, wherein the first compensated grayscale data includes overshoot data or undershoot data.

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14. A method for driving a liquid crystal display apparatus, comprising:
generating first compensated grayscale data in response to grayscale data for
a current frame and previously stored grayscale data for a previous frame;
generating second compensated grayscale data in response to the first
5 compensated grayscale data and the grayscale data for the current frame;
generating third compensated grayscale data in response to the first
compensated grayscale data and previously stored compensated grayscale data;
storing the grayscale data for the current frame and the second compensated
grayscale data;
10 applying a gate signal to gate lines; and
applying a data voltage corresponding to the third compensated grayscale
data to data lines.

15. The method according to claim 14, wherein the first compensated
15 grayscale data includes overshoot data or undershoot data.

16. The method according to claim 14, wherein storing includes storing
the grayscale data for the current frame and the second compensated grayscale
data in the same memory.

17. The method according to claim 16, wherein the number of bits of the
second compensated grayscale data is less than the number of bits of the grayscale
data for the current frame.

18. The method according to claim 14, wherein storing includes storing the grayscale data for the current frame in a first memory and storing the second compensated grayscale data in a second memory.

5 19. A method for driving a liquid crystal display apparatus, comprising:
generating first compensated grayscale data in response to grayscale data for a current frame and previously stored grayscale data for a previous frame;
generating second compensated grayscale data in response to the first compensated grayscale data and previously stored compensated grayscale data;
10 generating third compensated grayscale data in response to the second compensated grayscale data for the current frame and the grayscale data for the current frame;
storing the grayscale data and the third compensated grayscale data;
applying a gate signal to gate lines; and
15 applying a data voltage corresponding to the second compensated grayscale data to data lines.

20 20. The method according to claim 19, wherein the first compensated grayscale data includes overshoot data or undershoot data.

21. The method according to claim 19, wherein storing includes storing the grayscale data for the current frame and the third compensated grayscale data in the same memory.

22. The method according to claim 21, wherein the number of bits of the third compensated grayscale data is less than the number of bits of the grayscale data for the current frame.

5 23. The method according to claim 19, wherein storing includes storing the grayscale data for the current frame in a first memory and storing the third compensated grayscale data in a second memory.